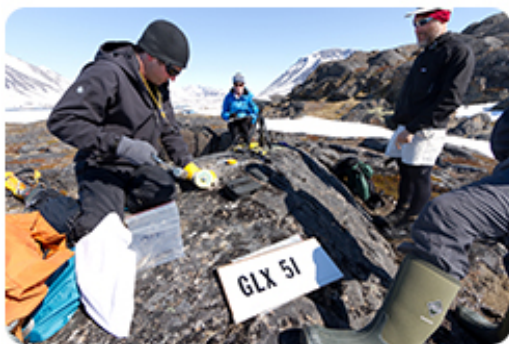


LIVERMORE LAB REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory April 21-25, 2014.



THERE'S SOMETHING ANCIENT IN THE ICEBOX



Former LLNL researcher Dylan Rood performs geology field work in eastern Greenland. Rood took dirt samples and analyzed them to determine an ancient landscape millions of years old is preserved underneath the Greenland Ice Sheet.

As glaciers move over the land they scrape off everything -- vegetation, soil and even the top layer of bedrock.

But in Greenland, a country covered in ice, that didn't happen. In fact, a research team including former Lawrence Livermore scientists Dylan Rood found an ancient tundra landscape preserved under the Greenland Ice Sheet, below two miles of ice.

The organic soil has been frozen to the bottom of the ice sheet for 2.7 million years. The findings provide strong evidence that the Greenland Ice Sheet has persisted much longer than previously known, enduring through many past periods of global warming.

To read more, go to [Red Orbit](#).



Lab seismologist Stephen Myers and former Lab scientist Siegfried Glenzer recently received the E.O. Lawrence Award.

The Department of Energy has recognized two Lawrence Livermore Laboratory researchers for their contributions to science, energy and national security.

Lab seismologist Stephen Myers, for advancing national security and nonproliferation, and former lab scientist Siegfried Glenzer, for advancing fusion and plasma sciences, both earned the Ernest Orlando Lawrence Award.

Myers, who conducts research in the Lab's Global Security program, was honored for developing more accurate seismic monitoring technologies to locate nuclear explosions. Glenzer, who worked at the Lab from 1995 to 2013 before joining the SLAC National Accelerator Laboratory at Stanford University, won for his work at the National Ignition Facility, where he advanced the understanding of high-energy density physics through novel X-ray scattering techniques.

Each will receive a DOE citation, a gold medal bearing the likeness of E.O. Lawrence and \$20,000.

To read more, go to the [Contra Costa Times](#).



Sediment cores were taken from lakes in and around Gates of the Arctic National Park.

Research from ancient sediment cores indicates that a warming climate could make the world's arctic tundra far more susceptible to fires than previously thought. The findings are important given the potential for tundra fires to release organic carbon -- which could add significantly to the amount of greenhouse gases already blamed for global warming.

The team examined ancient sediments from four lakes in a remote region of Alaska in and around Gates of the Arctic National Park to determine what kind of vegetation existed in the area after the last ice age, 14,000 to 9,000 years ago.

Using Lawrence Livermore's Center for Accelerator Mass Spectrometry, Lab researcher Tom Brown looked at fossilized pollen grains in the sediment cores. The findings suggest that after the last ice age, the arctic tundra was very different from what it is now. Instead of being covered with grasses, herbs and short shrubs, it was covered with vast expanses of tall birch shrubs.

Charcoal preserved in the sediment cores also showed evidence that those shrub expanses burned frequently.

To read more, go to [Science Codex](#).



The melting of glaciers in the Arctic is one of the effects of climate change.

Are extreme weather events tied to climate change?

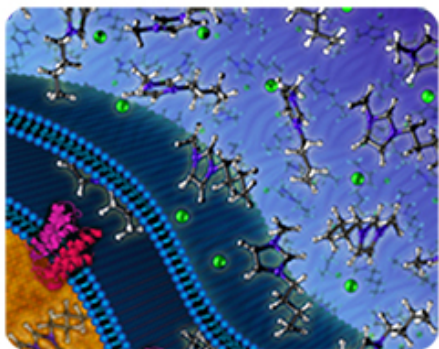
Lawrence Livermore climate scientist Ben Santer recently spoke at the Commonwealth Club of California about more extreme weather events.

He said the game changed after the European heat wave in 2003. "We're changing the large-scale conditions that influence typhoons and hurricanes," Santer said. "These human-caused changes would generate more intense hurricanes and typhoons.

"Natural variables won't go away. It's the backdrop of a slowly evolving human influence on the intensity" of these extreme events.

To listen to more, go to [Minnesota Public Radio](#).

BIOMASS M A G A Z I N E **SIMPLY RESISTIBLE**



Researchers discovered a resistance mechanism in a rainforest soil bacterium that enables *E. coli* to grow and produce biofuel in the presence of ionic liquids.

Resistance is not futile when it comes to a new method to more efficiently convert biomass to biofuels.

New research by scientists from Lawrence Livermore National Laboratory, in conjunction with the Joint BioEnergy Institute, suggests that a type of bacterial resistance may provide more efficient production of biofuels.

The team identified the genetic origin of bacterial resistance to an ionic liquid (a salt in the liquid state), which they successfully introduced into a strain of *E. coli* bacteria for the production of advanced biofuels. The ionic liquid resistance is based on a pair of genes discovered in a microbial species native to a tropical rainforest in Puerto Rico.

"Ionic liquids are used as potent solvents to extract cellulose from biomass, so that it can be broken down to sugars used by microbes to make advanced biofuels -- new liquid fuels that go beyond ethanol and can replace gasoline or diesel," said Michael Thelen, an LLNL biochemist who also is part of JBEI's Deconstruction Division.

To read more, go to [Biomass Magazine](#).

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance. To send input to the *Livermore Lab Report*, send [e-mail](#)